

### **Remarks**

Claims 1-20 remain in this application.

Claim 8 has been amended to correct an editorial error in which the phrase "upper ferromagnetic layer" should have read -- upper antiferromagnetic layer--. Support for this correction may be found on page 8, lines 13-21.

New claims 21, 22 and 23 have been added to more distinctly claim the invention. Support for claims 21-23 may be found on page 6, lines 16-32. The Examiner is respectfully requested to enter the new claims for consideration in the application.

### **Information Disclosure Statement**

The Examiner stated that the listing of references in the specification is not a proper information disclosure statement. To rectify this omission, an Information Disclosure Statement together with the fee set forth in 37 CFR 1.17(p) is attached hereto.

### **Drawings**

The drawing were objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: Figure Number 66.

Applicant respectfully directs the Examiner's attention to page 6, lines 22-24 in the specification which, with reference to Figure 2, states "The upper ferromagnetic layer 64 overlies and contacts at least a portion of the upper antiferromagnetic layer 62 on a second contact face 66 lying parallel to the sensor surface plane 54". Also, on page 7, lines 10-11 the specification states "In Figures 3-4, elements previously discussed are assigned the same reference numerals, and the descriptions are incorporated herein". Applicant believes that this reference to "the second

contact face 66" complies with the requirements of 37 CFR 1.84(p)(5). Therefore, the Examiner is respectfully requested to withdraw the objection to the drawings.

### **Specification**

The disclosure was objected to because of the following informalities:

On page 6, lines 26-32, are unclear and confusing.

On page 7, line 29, "72" should be --62--.

The specification has been amended to address the informalities. The paragraph beginning at page 6, line 27 has been replaced with a new paragraph which specifically refers to free layer 60 as contacted through the first contact face 63 (line 29) and corrects the reference number of the second contact face to be 66 instead of 63 (line 31). On line 31, the reference number 62 has been added after "the upper ferromagnetic layer". These changes are believed to clarify the description and remove confusion. No new material has been added.

The paragraph beginning on page 7, line 22 has been replaced with a new paragraph to correct the reference number on page 7, line 29 from "72" to --62--.

### **Section 102(e) rejection of claims 1-4, 7-12, 14, 15, 18 and 19**

In section 1 of the Office Action, claims 1-4, 7-12, 14, 15, 18 and 19 were rejected under 35 U.S.C. 102(e) as being anticipated by Hasegawa et al. (US 6,496,338).

Applicant respectfully traverses this rejection on the ground that the reference does not teach every element of the claim (MPEP 2131).

First, claims 1 and 7 recite, in relevant part, the following limitation:

"an upper antiferromagnetic layer overlying at least a portion of the free layer;"  
(Claim 1, line 4-5, claim 7, lines 5-6).

In contrast, Hasegawa et al. teaches "--the antiferromagnetic layers 46 are provided so that the ends thereof cover the sides of the antiferromagnetic layer 41, the pinned ferromagnetic layer 42 and the non-magnetic layer 43, and *cover the sides of the free ferromagnetic layer 44* to about half the thickness thereof." (Col. 11, lines 7-12 and Fig. 3) (emphasis added). Thus, the antiferromagnetic layer does not overlie a portion of the free layer as claimed in Applicant's invention, but only covers the sides of the free layer. It should be realized that as depicted in Fig. 3, the thickness of the free layer is greatly exaggerated relative to its in plane dimensions so that what may appear to be significant overlap of a portion of the free layer is in reality essentially zero overlap since the sides of the free layer are actually nearly vertical when drawn to scale. The antiferromagnetic layer of Hasegawa et al. fails to overlie the free layer but merely abuts the sides of the free layer.

Second, claim 1 recites, in relevant part, the following limitation:

"an upper ferromagnetic layer overlying and contacting at least a portion of an upper antiferromagnetic layer on a contact face lying parallel to the sensor surface plane, so that the upper antiferromagnetic layer lies between the upper ferromagnetic layer and the free layer." (Claim 1, lines 6-9, claim 7)

Hasegawa teaches "The ferromagnetic layer 47 on the antiferromagnetic layers 46 are provided so that the ends thereof cover the *sides* of the free ferromagnetic layer 44 to about half of the thickness thereof." (Col. 11, lines 12-15 and Fig. 3) (emphasis added). The ferromagnetic layer 47 and the antiferromagnetic layers 46 fail to cover the free ferromagnetic on a contact surface that is parallel to the sensor surface plane but rather on a plane more nearly perpendicular

to the sensor surface plane. The ferromagnetic layer 47 and the antiferromagnetic layers 46 merely abut the *sides* of the free layer so that the antiferromagnetic layer only comes between the ferromagnetic layer and the free layer over a negligible portion of the free layer on the sides that are not on a plane parallel to the sensor surface plane.

Similarly, claim 18 recites, in relevant part, the following limitation:

"an upper ferromagnetic layer overlying and contacting at least a portion of an upper antiferromagnetic layer on a contact face lying surface parallel to the sensor plane, so that the upper antiferromagnetic layer lies between the upper ferromagnetic layer and the magnetoresistance sensor." (Claim 18, lines 12-15)

Hasegawa teaches "The ferromagnetic layer 47 on the antiferromagnetic layers 46 are provided so that the ends thereof cover the *sides* of the free ferromagnetic layer 44 to about half of the thickness thereof." (Col. 11, lines 12-15 and Fig. 3) (emphasis added). The ferromagnetic layer 47 and the antiferromagnetic layers 46 merely abut the *sides* of the free layer so that the antiferromagnetic layer only comes between the ferromagnetic layer and the sides of the free layer over a negligible portion of the free layer on the sides that are not on a plane parallel to the sensor surface plane. The reference teaches the antiferromagnetic layer coming between the ferromagnetic layer and the *sides* of free layer and fails to teach the claimed limitation of an upper ferromagnetic layer lying between the upper antiferromagnetic layer and the magnetoresistance sensor.

Since the reference fails to teach an upper antiferromagnetic layer overlying at least a portion of a free layer and fails to teach an antiferromagnetic layer lying between an upper ferromagnetic layer and a free layer or a magnetoresistance sensor, the reference does not teach

all the elements of claims. Therefore, the Examiner is respectfully requested to withdraw the rejection with respect to claims 1, 7 and 18.

Since claims 2-4 depend on independent claim 1, claims 8-12, 14 and 15 depend on independent claim 7, and claim 19 depends on independent claim 18, and the grounds for rejection of independent claims 1, 7 and 18 have been overcome, the Examiner is respectfully requested to also withdraw the rejection with respect to dependent claims 2-4, 8-12, 14, 15 and 19.

**Section 103 rejection of claims 5, 16 and 20**

In section 2 of the Office Action, claims 5, 16 and 20 were rejected under 35 U.S.C. 103(a) as being unpatentable over Hasegawa et al. (US 6,496,338) as applied to claims 1, 7 and 18 above, and further in view of Gill (US 6,052,263).

Applicant respectfully traverses this rejection on the grounds that a Prima Facie Case of Obviousness has not been established because the references fail to teach or suggest all the elements of the claims (MPEP 2143.03).

As discussed above with respect to the section 102(e) rejection of claims 1, 7 and 18, the Hasegawa reference fails to teach or suggest an upper antiferromagnetic layer overlying at least a portion of a free layer as claimed in claims 1 and 7, and fails to teach or suggest an antiferromagnetic layer lying between an upper ferromagnetic layer and a free layer or a magnetoresistance sensor as claimed in claims 1 and 18, since the reference only discloses a ferromagnetic layer and an antiferromagnetic layer that abut the *sides* of the free layer. The Gill reference teaches a magnetic tunnel junction sensor, but is silent with respect to an upper antiferromagnetic layer overlying at least a portion of a free layer and an antiferromagnetic layer lying between an upper ferromagnetic layer and a free layer or a magnetoresistance sensor.

Since the combined references fail to teach or suggest all the elements of the claims of independent claims 1, 7 and 18 on which claims 5, 16 and 20 depend, Applicant submits that the Office has failed in its duty to establish a Prima Facie Case of Obviousness. Therefore, Examiner is respectfully requested to withdraw the rejection of claims 5, 16 and 20.

**Allowable Subject Matter**

In section 3 of the Office Action, claims 6, 13, and 17 were objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form. Applicant thanks the Examiner for indication of allowability of these claims.

Claims 6 has been amended to be in independent form including all the limitations of base claim 1. Claims 13 and 17 have been amended to be in independent form including all of the limitations of base claim 7. Allowance of claims 6, 13 and 17 is respectfully requested.

The other documents cited by the Examiner, but not applied to the claims currently in the application, have been reviewed and do not teach or suggest Applicants' claimed invention.

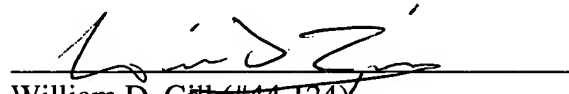
In view of the preceding remarks, Applicants believe that all the grounds for objection and rejection have been overcome and the pending claims are in condition for allowance and such action is respectfully requested.

Respectfully submitted,

H. Gill

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By:



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